Project Title: Effects of Concentrated Animal Feeding Operations (CAFOs) on Ground Water Quality

Principal Investigators: S. Hutchins, E. Striz

Project Period: 01/01/2000 - 09/30/2004

Long-Term Goal/APM: (1) WQ MYP - Long-Term Goal 2 - Provide the tools to assess and diagnose impairment in aquatic systems and the sources of associated stressors/APM (2004) - Report on potential of swine CAFOs to contribute COCs, pathogens, and EDCs to ground water; (2) EDC MYP - Long Term Goal 1 - Provide a better understanding of the science underlying the effects, exposure, assessment and management of endocrine disruptors/APM (2004) - Report on analytical method to monitor natural and synthetic hormones associated with risk management of CAFOs, APM (2006) - Report on the potential of biodegradation to remove hormones from ground water associated with CAFOs; Long Term Goal 2 – Determine the extent of the impact of endocrine disruptors on humans, wildlife, and the environment/APM (2004) – Report on potential of swine CAFOs to contribute EDCs to the environment (equivalent APM in Water Quality MYP)

Abstract: This research focuses on the potential for ground water contamination from swine CAFOs in Oklahoma. Three CAFOs have been selected for study, including a new farrowing sow operation, an existing nursery operation , and a closed combined facility. For the sow and combined facilities, ground water samples were simply obtained from existing wells and analyzed for standard water quality indices as well as total organic carbon, nutrients, cations/metals, pharmaceutical chemicals, estrogens, and pathogen indicator organisms. The nursery field site study was much more extensive, and site characterization included core acquisition and logging, geoprobe electrical conductivity logging, completion and monitoring of numerous cluster wells, stable isotope studies, slug testing, and other activities over the three-year monitoring period. Data from this well-characterized site will be used to develop a ground water flow model. Results from all of these studies will be used to determine whether ground water aquifers are at risk, and to develop sound risk management strategies for sustainable development.

Status: This task is being funded with both Water Quality and EDC funds. Most of this work has been completed and reports are in progress. The EDC 2004 APM report on analytical methods has been published. The Water Quality 2004 APM report is being prepared as an EPA report by S. Hutchins and E. Striz and will cover the field work to date at all three sites. Note that this report will also satisfy the EDC 2004 APM requirement. Two journal articles will be abstracted from this report; more may follow based on information garnered to date. Additional work will continue utilizing EDC funds to optimize the estrogen method for additional QA/QC. Completion of this task is expected in FY04.

Products: (1) Paper on analytical method to monitor natural and synthetic hormones associated with risk management of CAFOs *(completed - J. Chromatogr. A, 1017 (2003) 167-185)*; (2) Paper on the potential of swine CAFOs to contribute EDCs to ground water *(in press - Proceedings, Battelle Conference (2003)*, (3) EPA report on potential of swine CAFOs to contribute COCs, pathogens, and EDCs to ground water *(in preparation)*; (4) paper on nursery site ground water flow model *(planned)*, (5) paper on nursery site field study *(planned)*.